2019

The Effect of Emotional Competencies on Team Functioning

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THE EFFECT OF EMOTIONAL COMPETENCIES ON TEAM FUNCTIONING

A thesis submitted in partial fulfillment of the
requirements for the degree of
Master of Science

By

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B.A., Wittenberg University, 2012

2019
Wright State University

WRIGHT STATE UNIVERSITY

GRADUATE SCHOOL

NOVEMBER 5, 2019

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ABSTRACT

Borders, Morgan R. M.S. Department of Psychology, Wright State University, 2019. The Effect of Emotional Competencies on Team Functioning.

Collaboration, cohesion, and trust within teams can lead to beneficial outcomes such as innovation, speed of innovation delivery, enhanced creativity, and improved performance. Because of the prevalence of teams in the workforce, it is important that teams function at their highest capacity. One way to enhance team functioning may be to improve emotional intelligence (EI) in team members. Research has shown that higher EI is related to individual benefits such as stress resilience, better communication, relationship satisfaction, and improved performance. Team benefits of higher EI include greater cohesion, cooperation, trust, and performance. This study examined whether an emotional competency training could enhance EI abilities in adults, and whether the trained EI abilities related to higher team collaboration, trust, and performance. Undergraduates (N = 135) participated in teams of three that were randomly assigned to an EI training or control condition. Results indicated that the training did not significantly increase EI abilities, team collaboration, or trust. The training was related to better performance on one of two team tasks. It may be that simply spending time together as a team enhanced performance.

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I. INTRODUCTION

Innovation in science, technology, engineering, and mathematics (STEM) leads to advancements that improve quality of life, knowledge, functionality, and efficiency. The U.S. rankings in STEM fields continue to fall behind many other countries (Desilver, 2017). Recent data indicate that the U.S. is ranked 38th in mathematics and 24th in science out of 71 countries (PEW, 2015). This is down from 27th and 20th in the prior year (Pew, 2014). Many factors could be causing the rankings to fall, if this trend continues. One factor could be that the U.S. has excluded groups in STEM, often leading to an underrepresentation of women and minorities (National Science Foundation, 2017). Because of this underrepresentation, there is a smaller proportion of the population from which to expand cognitive diversity in STEM. Diversity in teams can lead to divergent thinking allowing for more creative problem solving (Aggarwal, Woolley, Chabris, & Malone, 2015). This underrepresentation in STEM is partially due to the "chilly" climate. Chilly climate is a common metaphor used to describe behaviors and attitudes toward primarily women and minorities in the white-male dominated workplace and in STEM educational settings that are characterized as devaluating, stereotyping, mistrusting, and harassing (Britton, 2016; Hall & Sandler, 1982; Prentice, 2000). One possible solution to creating more inclusive STEM fields is to enhance the climate, which may improve team collaboration, efficiency, and effectiveness. The purpose of this study was to investigate one avenue through which we might improve STEM teams by examining the influence of

emotional competencies and their trainability in adult teams. This study investigated whether training emotional competencies was possible and whether these competencies would improve team collaboration, trust, and performance.

Teams

Teams are prevalent in many domains including business, academia, science and sports. The use of collaborative, cohesive, and cooperative teams can lead to improved outcomes and team efficiency (Barczak, Lassk, & Mulki, 2010; Bell, Michalec, & Arenson, 2014; DeCusatis, 2008; Hoegl & Gemuenden, 2001; Schneider, Dowling, Payton, & Stokes, 2009). Team collaboration has been related to better patient outcomes and safer, more effective healthcare (Bell, Michalec, & Arenson, 2014), innovation and speed of innovation delivery (Inoue & Liu, 2015), and enhanced creativity and performance (Barczak, Lassk, & Mulki, 2010; DeCusatis, 2008; Hoegl & Gemuenden, 2001; Schneider, Dowling, Payton, & Stokes, 2009). One study examined the relationship between software development team collaboration, performance, and team member satisfaction (Hoegl & Gemuenden, 2001). Team collaboration was measured using the Teamwork Quality scale (TWQ) and performance was assessed by team members, team leaders, and managers. Each group rated performance based on team effectiveness (functionality of software) and team efficiency (on budget and on schedule). This study found a positive relationship between team collaboration and team performance; however, other factors may play a role in this relationship. Parallel research has shown that emotional intelligence (EI) is related to better team collaboration, performance, cooperation, communication, innovation, trust, and creativity (Arfara & Samanta, 2016; Barczak, Lassk, & Mulki, 2010; Hendon, Powell, & Wimmer 2017; Hjertø &

Paulsen, 2016; Inoue & Liu, 2015). Training EI skills in adults may lead to improvements in these areas.

Emotional Intelligence

EI was first defined by Salovey and Mayer in 1990 (see also Mayer and Salovey, 1997). According to Mayer and Salovey (1997), EI is "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (p. 10). These EI abilities are applied to both oneself and others (e.g., being able to manage and regulate the emotions in yourself and in other people). This definition fits well within traditional definitions of intelligence and correlates with cognitive ability measures (e.g. Armed Services Vocational Aptitude Battery) indicating that ability EI is a form of intelligence (Mayer, Salovey, Caruso, & Sitarenios, 2001; Roberts, Zeidner, & Matthews, 2001).

Research on EI has been guided by two models: 1) the ability model, which conceptualizes EI as an acquirable ability or competency, or 2) the mixed model, which conceptualizes EI as a fixed trait in combination with abilities. The two models are rooted in different theories and definitions of EI. The key difference between these models is that the ability model defines EI as a cognitive aptitude or ability whereas the mixed model includes non-cognitive abilities or traits, such as personality traits, mood, and interpersonal interactions (Mayer, Salovey, & Caruso, 2000). The ability model is represented by the Salovey and Mayer (1990; see also Mayer & Salovey, 1997) four-branch model. This ability model was the guide for the current study, wherein EI was defined and conceptualized as a

host of emotional abilities, rather than traits.

The Mayor and Salovey model (1997), is comprised of four abilities, or branches, 1) perception of emotions, 2) use of emotions to facilitate thinking, 3) understanding emotions, and 4) management of emotions. The perception of emotions encompasses the ability to identify and perceive emotions in oneself and in others, including other stimuli such as music or art. The use of emotions to facilitate thinking includes the ability to use, generate, and feel emotions in a way that focuses or broadens attention and assists in cognitive tasks. For example, positive emotions can be helpful in creative endeavors or verbal tasks whereas negative emotions can be helpful in spatial tasks and inhibiting false memories (Gray, 2001; Isen, Daubman, & Nowicki, 1987; Storbeck & Clore, 2005). Understanding emotions includes the ability to understand emotional words and the ways that emotions combine, interact, and evolve. The management of emotions involves the ability to regulate emotions in oneself and others. This branch includes abilities such as discriminating, labeling, and being open to one's own feelings and the emotions of others. These four branches comprise EI and have been correlated with beneficial behaviors for individuals and teams

The Influence of EI in Individuals. Most studies that examine EI have used self-report measures (i.e., mixed-model) of EI, relative to ability measures. And most ability-based EI studies are correlational in nature. Still, there are findings that can be distilled from both types of studies. Research has found that EI is related to individual outcomes such as salubrious stress responses and stress resilience (Schneider, Lyons, & Khazon, 2013), better student performance (Brackett, Rivers, Reyes, & Salovey, 2012; Rivers, Brackett, Reyes, Mayer, Caruso, & Salovey, 2012), greater relationship satisfaction (Brackett, Warner, &

Bosco, 2005), increased social competence (Rivers, Brackett, Reyes, Mayer, Caruso, & Salovey, 2012) and enhanced leadership capabilities (Kerr, Garvin, Heaton, & Boyle, 2006; Rosete & Ciarrochi, 2005). People with higher self-reported EI are better at communicating, have more empathy, and more positive attitudes (Choi, Oh, Guay, & Lee, 2011; King, Mara, & DeCicco, 2012; Platsidou & Tsirogiannidou, 2016). One study examined the relation between EI and communication adaptability in information-technology professionals, using self-reported EI and communication measures (Hendon, Powell, and Wimmer, 2017). Findings suggested that higher reported EI was related to better reported communication between individuals.

Similar research has examined the association between EI and social relationships (Lopes, Brackett, Nezlek, Shutz, Sellin & Salovey, 2004). In one study, researchers examined the relation between ability-based EI and relationship quality among friends. Self-reported personality and emotion regulation skills were assessed, as were self- and other-reports of quality of interpersonal relationships, interpersonal competence, and socially desirable responding. Measures were completed at varying times during a school semester. Findings from this first study showed that the branch managing emotions was positively related with higher self-perceived and other-perceived positive social interactions, and higher other-reports of emotional support. The second study examined this same association between ability EI and relationship quality using the same ability measures as the first study. Self-esteem, self-acceptance and the acceptance of others, self-presentation style, and self-deceptive enhancement were assessed with self-report measures. In contrast to the first study, this study examined everyday interactions using a structured diary. Participants were directed

to complete the diary every day for two weeks for every face-to-face social interaction lasting at least 10 minutes. Results of the second study found that the branch managing emotions and the branch using emotions to facilitate thinking were positively associated with the quality of social interactions. However, managing emotions was only significantly related to the quality of social interactions for romantic partners. Managing emotions was positively correlated with perceived success of self-presentation in social interactions, also. All in all, these two studies suggest that EI, particularly managing emotions and the ability to use emotions, can be beneficial for people personally and socially.

The Influence of EI in Teams. Team level benefits of individual EI and composite EI at the group level have been well documented across domains such as academics, athletics, medicine, and the workplace (e.g., Arfara & Samanta, 2016; Offermann, Bailey, Vasilopoulos, Seal & Sass, 2004; Luca & Tarricone, 2001). Group level EI is comprised of individual EI from group members, which can affect the emotions of one's team and the emotions of other teams (Druskat & Wolff, 2001). Although, the majority of team EI research has been correlational and relied on self-report measures (i.e., mixed-model), as opposed to ability measures of EI, findings can be extracted and used to inform future research. The current study focused on individual EI effects at both the individual and team levels leveraging an experimental, as opposed to correlational, design.

Research has found that different branches of EI, such as emotional understanding and management, is related to better team cohesion, cooperation, and trust between team members (Arfara & Samanta, 2016; Barczak, Lassk, & Mulki, 2010; Luca & Tarricone, 2001). Other research has found a positive relationship between EI (both team and

individual) and team performance (Arfara & Samanta, 2016; Hjertø & Paulsen, 2016) and efficiency (Günsel & Açikgöz, 2013; Hoegl & Gemuenden, 2001). One study examined EI in 19 teams, 131 employees, at the National Centre for Public Administration and Local Government in Greece (Arfara & Samanta, 2016). Researchers created a composite measure of EI and teamwork (i.e., cooperation, trust, management of difficult situations, and goal commitment). This measure was comprised of items selected from three EI measures. Two measures were self-reported EI and the last measure was an ability measure of EI. Items selected specifically focused on the perception and management of emotions. Higher reported perception and management of emotions were related to greater team trust, better cooperation, and organizational goal achievement. Although, the reliability of the composite EI measure used is questionable, this study provided evidence that there may be an association between EI subscales and working adult teams.

Emotional competencies, assessed by self-report measures, have been associated with the successful completion of student projects (Offermann, Bailey, Vasiloulos, Seal & Sass, 2004) and effective team academic performance (Hjertø & Paulsen, 2016). Hjertø & Paulsen (2016) examined the relation between team EI and team academic performance. Self-report measures of group level self-efficacy, belief in team efficacy, and interdependence were used. Team academic performance was measured using the team grade on two-reports. Although EI was conceptualized as an ability in this study, a self-report measure of EI was used thus assessing EI by means of the mixed-model. Team EI predicted team academic performance beyond group level self-efficacy and the belief in team efficacy when interdependence was used as a control variable. The self-reported abilities of evaluating

emotions of others and regulating emotions predicted team academic performance better than the use of emotion and evaluating one's own emotions. Findings suggest that EI may be a factor in team performance across domains and ages. These results beg the question as to whether emotional competencies can be trained, however, the limited research on training emotional skills has primarily focused on children.

EI Training for Children. Researchers have developed and evaluated curricula that aim to improve the social and emotional development of children and to enhance the classroom climate (Rivers & Brackett, 2011). One curriculum is the RULER Feeling Words Curriculum. RULER focuses on the four-branch model of EI and stands for *recognizing* emotions in self and others, *understanding* the causes and consequences of emotions, *labeling* emotions accurately, *expressing* emotions appropriately, and *regulating* emotions effectively (Rivers & Brackett, 2011). This curriculum aims to enhance emotional literacy to improve emotional skills, social skills, and aspects of the classroom climate such as the relationship between students and teachers and classroom organization. Research has demonstrated that the RULER curriculum predicts positive outcomes for both students and teachers (Brackett, Rivers, Reyes, & Salovey, 2012; Castillo, Fernandez-Berrocal, & Brackett, 2013). One study in Spain showed that teachers who were enrolled in a six-month RULER training, compared to a six-month E-learning training, had higher self-reported ratings of teacher responses to student emotions, personalized interactions with students, and caring beyond the classroom (Castillo, Fernandez-Berrocal, & Brackett, 2013). Teachers in the curriculum also had higher ratings of personal accomplishment and work engagement, including greater work-related energy. A quasi-experimental study with 273 fifth- and sixth-

graders explored the effect of RULER over the course of an academic year (Brackett, Rivers, Reyes, & Salovey, 2012). Either the fifth- or sixth grade classes at each of three participating schools was randomly assigned to RULER, and the other corresponding grade used in the standard curriculum serving as the comparison group. Students exposed to the RULER curriculum had higher year-end grades, higher teacher ratings of emotional competencies, and better teacher-rated work habits/social development (e.g., leadership, social skills, and study skills), compared to the standard curriculum group. RULER effectively improved outcomes for teachers and students, including enhancing emotional skills, social skills, engagement, the classroom climate, and performance.

Randomized controlled trials (RCTs) have shown that social and emotional curricula can be effective (Baker-Henningham, Walker, Powell, & Meeks Gardner, 2009; Hagelskamp, Brackett, Rivers, & Salovey, 2013; Rivers, Brackett, Reyes, Elbertson, & Salovey, 2013). In Jamaica, a pilot RCT examined the effectiveness of the Incredible Years Teacher Training curriculum for training social and emotional skills in children, compared to the standard program in schools (Baker-Henningham, Walker, Powell, & Meeks Gardner, 2009). Participants included 27 classrooms distributed across five schools. Schools pairings were made based on the type of school (e.g., SES of families served) and classroom characteristics (e.g., self-contained or separated by chalkboards).One school of each pair was randomly assigned to either the curriculum or the standard school program. The curriculum included role playing, discussion, and training, emphasizing how to apply social and emotional skills to specific classroom situations. Units within the curriculum taught emotional and life skills topics, such as how to understand and detect feelings, problem

solving, and how to be friendly. Trained researchers completed structured observations and rating scales of child behavior and of the classroom atmosphere to assess emotional climate. The researcher used an observation manual to complete the structured observations, which focused on the teachers' influence on the classroom climate. The structured observation included whether the teacher promoted children's emotional and social competence through talking about feelings and encouraging interpersonal skills, and positive teacher behaviors (e.g., use of praise). The rating scales of child behavior and classroom atmosphere focused on the children's appropriate or inappropriate classroom behavior (e.g., aggressive behaviors or distracting others), how interested and enthused children appeared, and the warmth of the teacher. The classroom climate and behaviors improved in the curriculum condition, whereas behaviors and classroom climate worsened for the standard curriculum. Trained researchers reported that positive teacher behaviors increased, they showed more warmth, and the encouraged student social and emotional competencies in the experimental condition. Children engaged in more appropriate behaviors, had more interest in class, and more opportunities to use positive interpersonal skills. Overall, this study provides evidence that social and emotional skills training can improve classroom climate and the social and emotional behaviors of children.

Another RCT examined the effect of the RULER curriculum compared to the standard English Language Arts curriculum in 155 classrooms across 62 schools in the United States (Rivers, Brackett, Reyes, Elbertson, & Salovey, 2013). Schools were randomly assigned to either the control or the RULER condition. Classroom climate was measured using observations, student ratings, and teacher ratings. The Classroom Assessment Scoring

System was used to measure classroom social and emotional quality by assessing factors such as classroom warmth and whether teachers focused on the interests and needs of students (Pianta, La Paro, & Hamre, 2008). Student's rated their perceptions of their teacher and peers on social and emotional behaviors and interactions. Teacher ratings focused on student social interactions, whether the teacher used emotional skills when interacting with students, and whether the teacher provided opportunities for students to practice their interpersonal skills. The RULER curriculum improved classroom climate compared to the standard curriculum. Comparatively, RULER classrooms had higher ratings of emotional support, positive and emotion focused interactions, and student autonomy and leadership skills. These RCTs have demonstrated that theory-driven emotional competency training can have a positive effect on child and teacher behavior in the classroom.

EI Training for Adults. Few studies have examined the effectiveness of an ability-based, theory-driven training designed to enhance emotional competencies in adults. Of the studies with adults, many conceptualized and measured EI as a trait (i.e., mixed-model), and few focused on developing a theory-driven, ability-based training. In studies where EI was considered a trait, training should have been ineffective because EI should remain stable over time, similar to other personality traits. One mixed-model EI study examined the effect of an EI training for rugby players (Campo, Laborde, and Mosley, 2016). This study assessed mixed-model EI with a self-report measure. This measure included four factors that assessed well-being, self-control, emotionality, and sociability. The training for this study included four sessions that lasted from 45 to 90 minutes. Six additional sessions were used for pre- and post-testing. The training was created to be specifically relevant to the participants by

using tools and exercises related to rugby. The training included homework to be completed between sessions and handouts with key points from each training session. The control group participated in group video match analysis sessions focusing on the technical aspect of the sport. The EI training successfully increased aspects of EI, including social competence, emotion perception, and emotion management. The training in this study was not based on the abilility-based theory of EI and would not easily be applied to other domains. Importantly, this study conceptualized EI as a trait instead of an ability, yet it showed improvement in EI. This study provides evidence that EI can be changed in adults, which also suggests that EI is likely not a trait, but rather an acquirable ability as theorized originally.

The effectiveness of ability-based, theory-driven emotional skills trainings for adults have been examined in two RCTs (Crombie, Lombard, & Noakes, 2011; Reuben, Sapienza, & Zingales, 2009). One study examined the effect of EI training in two cohorts of cricket players in South Africa over two years (Crombie, Lombard, & Noakes, 2011). Forty-eight participants (24 each year for two years) were randomly assigned to either the experimental or the control condition (no intervention). The training consisted of 10 three-hour sessions and was based on the four-branch model of EI. The concept of EI was introduced and the training applied the four-branches of EI to generic and sport-specific case studies. After the training, participants were advised to use a diary to keep track of and analyze personal EI experiences. An ability measure was used to assess EI pre- and post-training. Findings showed that the training significantly increased EI for both cohorts in the study, compared to the no intervention control.

The second RCT examined whether EI could be trained effectively in adult students (Reuben, Sapienza, & Zingales, 2009). MBA students at the University of Chicago Booth School of Business ($N = 151$) participated as a part of a two-year longitudinal study. Participants were randomly assigned to the EI training condition, the resiliency training condition, or the business skills training condition (control condition). The EI training was developed to teach the abilities outlined in the four-branch model of EI. The resiliency training was designed to enhance emotional responses to difficult situations and was developed around providing feedback to students based on their attributional style. The business skills training taught topics such as impression management, business etiquette, and career appropriate behaviors. All three training conditions lasted five weeks with two three-hour sessions per week. Only 16 hours were used for teaching and the remaining time was used for testing for the longitudinal study. EI was assessed with an ability measure before and after participants completed the training and the number of sessions attended by each student was tracked. Participants in the EI training group increased their EI scores the most, followed by the resiliency group. Those in the control group did not improve their EI scores. For the EI condition only, the understanding emotions ability was the only branch with a significant improvement after training. The remaining abilities, perceiving emotions, using emotions, and managing emotions, did not change significantly for any condition. Missing sessions played an important role in EI training, but not for the resiliency training or business skills training. Each missed session in the EI training condition reduced the effectiveness of the EI training. This effect was strongest for the understanding emotions ability. This study suggests that targeted EI training can improve EI, as well as resiliency training but to a lesser

extent, and exposure appears to play a role in the effectiveness of the EI training.

The RCTs conducted with adults that conceptualized and measured EI as an ability have provided compelling evidence that EI can be improved through training. However, the training curricula implemented with children and adults requires many hours over several days (e.g., Crombie, Lombard, & Noakes, 2011; Rivers, Brackett, Reyes, Elbertson, & Salovey, 2013). The current study examined the effectiveness of a brief interactive training aimed at enhancing EI abilities to discern whether it could promote team functioning. It was hypothesized that compared to controls, teams trained in emotional abilities would have higher overall and subscale EI scores on an ability- based EI measure, higher reported team collaboration and team trust, and would perform better on team tasks.

II. METHOD

Participants

A power analysis indicated that 51 participants, 17 groups of three, were needed to detect a large effect size of .96. This effect size was determined based on the combined effect sizes of the two adult-focused RCTs that conceptualize EI as an ability (Crombie, Lombard, & Noakes, 2011; Reuben, Sapienza, & Zingales, 2009). The effect size for each study was calculated based on pre- and post-test change scores for the control and experimental groups. These effect sizes were averaged together controlling for sample size. However, this study builds upon team research that has typically used larger sample sizes. For example, three studies that examined collective intelligence and team performance used 40 teams, 152 teams, and 60 teams (Engel, Woolley, Jing, Chabris, & Malone, 2014; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010). Based on the wide range of sample sizes from the power analysis and prior research, 135 undergraduate students (45 teams of three) from a Midwestern university volunteered in exchange for partial course credit and for the opportunity to win one of two $50 Amazon gift cards. There were 24 teams in the control condition and 21 teams in the experimental condition. All participants were over 18 years of age (M = 21.38, SD = 5.44) and most were freshmen (43.30%), recruited from psychology courses. The majority of participants were Caucasian (69.70%) and female (61.90%).

Design

This study used a post-test only design with an experimental and control group to examine the effectiveness of the EI training, and the relationship between EI and collaboration, trust, and performance. Three-person groups were randomly assigned to either

the experimental condition or the control condition. In the experimental condition, participants engaged in the 1.5-hour training. The control group did not participate in a training, but participants interacted for approximately 10 minutes before completing the team tasks and the questionnaires.

Training

The purpose of the training was to teach trainees the skills needed for emotional competency and how to use these skills in a variety of personal and social situations, including teams. The EI training took approximately 1.5 hours to complete and was based on the four-branch model of EI by Mayer and Salovey (1997). The training included four parts: 1) Introduction to Emotions and Teams, 2) Perceiving and Understanding Emotions, 3) Using Emotion to Facilitate Thinking, and 4) Managing Emotions. The training began with a conversation about emotions and working in teams, and continued by discussing emotions, emotional competencies based on the four branches, and provided hands-on practice. The details of this training cannot be discussed as they are proprietary.

Measures

Emotional Intelligence. EI was measured using the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT V2.0; Mayer, Salovey, Caruso, & Sitarenios, 2003). The MSCEIT V2.0 is a 141-item, ability measure that takes approximately 30 to 45 minutes to complete online. The MSCEIT V2.0 is a reliable ($\alpha = .93$) measure of EI. Measures were considered reliable when the standardized Cronbach's alpha was .70 or higher (Tabachnick & Fidell, 1989). The MSCEIT V2.0 is less susceptible to faking caused by factors such as social desirability because it measures abilities rather than traits. EI is composed of four

subscales: (1) Perceiving Emotions, (2) Facilitating Thinking, (3) Understanding Emotions, and (4) Emotional Management. The Perceiving Emotions subscale includes the faces task and the pictures task. In the faces task, for example, participants are shown a string of faces and are asked to respond on a 5-point scale to indicate the degree to which a given emotion is present. The Facilitating Thinking subscale includes the sensations task and the facilitation task. In the sensations task participants are asked to produce an emotion and match sensations to it. The Understanding Emotions subscale includes the blends task and the changes task. The blends task assesses participant ability to understand that certain situations elicit certain emotions (e.g., death can elicit sadness). The Emotional Management subscale includes the emotion management task and the emotional relations task. In the emotional relations task, participants evaluate how effective a different behavior would be at achieving an outcome that involves other people. Each task has a different question and response method. Response and question types are varied, in part, to minimize correlated measurement error (Mayer, Salovey, Caruso, & Sitarenios, 2003). Scoring of the MSCEIT V2.0 is completed online with either general consensus where every participant's answers are compared to those of the larger sample or expert scoring where participant answers are compared to those of experts. Example items are not included for this measure because it is copyrighted. The consensus scoring method was used to obtain overall and subscale scores for the current study.

Collaboration. Perceived collaboration was measured using the TWQ ($\alpha = 0.92$), a measure of teamwork quality (Hoegl & Gemuenden, 2001). Teamwork quality is purported to be a latent construct that reflects team collaboration in six areas: 1) communication, 2)

coordination, 3) balance of member contributions, 4) mutual support, 5) effort, and 6) cohesion. The TWQ has 38 items with three to 10 items for each subscale. The subscales are: 1) communication (example item: "Project-relevant information was shared openly by all team members," $\alpha = 0.71$), 2) coordination (example item: "The goals for subtasks were accepted by all team members," $\alpha = 0.53$), 3) balance of member contributions (example item: "Imbalance of member contribution causes conflicts in our team (reverse scored)," $\alpha = 0.59$), 4) mutual support (example item: "The team members helped and supported each other as best they could," $\alpha = 0.77$), 5) effort (example item: "Our team put much effort into the project," $\alpha = 0.69$), and 6) cohesion (example item: "Our team was sticking together," $\alpha = 0.70$). Items were rated on a 5-point Likert scale ranging from 1 (*Not true*) to 5 (*Very true*). Because this study included a short interaction, TWQ items referencing long-term interactions were excluded. An example of an excluded item is "The team members communicated often in spontaneous meetings, phone conversations, etc." Two of the subscales, coordination and balance of team member contributions, were unreliable (alphas <.70). It could be that the tasks used in the current study did not lend themselves to answer these subscales reliably. For example, coordination was limited because the goal of the tasks was set for the team and clearly communicated, and the limited interactions among teammates reduced the participant's ability to assess the balance of team member contributions.

Trust. Prior research has found a positive relationship between EI and state trust in teams (Barczak, Lassk, & Mulki, 2010; Arfara & Samanta, 2016). Trust was measured using an adapted version of perceived trustworthiness (Mayer & Davis, 1999). Items were adapted

to reflect trust between *team* members. This is a reliable ($\alpha = 0.91$) self-report measure with a total of 17 items. There are three subscales: ability, benevolence, and integrity. The ability subscale has six items (example item: "My teammates are very capable of performing their jobs," $\alpha = 0.83$). The benevolence subscale has five items (example item: "My teammates are very concerned about my welfare," $\alpha = 0.83$). The integrity subscale has six items (example item: "My teammates have a strong sense of justice," $\alpha = 0.72$). Items were rated using a 5-point agreement scale ranging from 1 (*Disagree strongly)* to 5 *(Agree strongly)*.

Performance. Each team participated in two 10-minute tasks to obtain team performance scores, as used in past research (Woolley, Chabris, Pentland, Hashmi, & Malone, 2010). Woolley et al. (2010) used tasks from the McGrath Task Circumplex (McGrath, 1984), which is a taxonomy of tasks based on the required coordination process needed by the group to complete the task. Woolley et al. (2010) used at least one task from each of the four quadrants included in the taxonomy. For this study, we used tasks from two quadrants to evoke the construction of novel responses and coordination from teams. One task was a brainstorming task in which participants generated as many ideas as possible for the use of a brick. Groups received one point for every unique idea regardless of the quality. The second was a word completion task where participants were provided a list of 37 English words with two to three letters missing (e.g., d _ u _ t would be doubt). Groups completed as many words as possible in the allotted 10 minutes and each correctly completed word was worth one point. The tasks were counter balanced so that half of the teams received the brick task first and the other half received the word completion task first. Performance was assessed by the number of points earned for each task.

Procedure

This research study comprised two-parts, the first was online and the second was in-person. Participants provided consent before their participation in both parts. Participants completed the online demographics questionnaire prior to the in-person session. Participants were assigned to groups of three, which were randomized into either the control or experimental condition. At the in-person session, participants were re-consented. Participants completed a brief questionnaire about their familiarity with their other teammates, then participated in either the training (experimental condition) or a team introduction (control condition). Following the training or introduction, all teams completed the two teamwork tasks. Afterwards, participants completed the team collaboration, team trust, and EI assessments. Participants were then debriefed.

III. RESULTS

Preliminary analyses

To examine the similarity among team members on their EI scores, an inter-class correlation (ICC) estimate was calculated based on a single-measurement, consistency, 2-way mixed-effects model. The similarity within teams was minimal, ICC = -.14, 95% CI[-.16, .18], $F(44, 88) = .96$, $p = .55$. Consequently, hypotheses were tested at the individual rather than team level. Before testing hypotheses, the pattern of correlations across key variables were examined. Overall EI score, collaboration, and trust were positively correlated with age, *r's*(133) > .20, *p's* < .02 (see Table 1). See Appendix A for non-STEM and STEM correlation tables (Table 3 and Table 4). Subsequent analyses examining the overall EI score, collaboration, and trust included age as a covariate. The word task performance score was correlated positively with age and order of task presentation, *r's*(133) > .20, *p's* < .05. Subsequent analyses including the word task included age and task order as covariates.

Group Differences in EI

To test the hypothesis that participants receiving EI training would have higher EI scores than controls, an Analysis of Covariance (ANCOVA) controlling for age was computed. There was no significant difference in EI scores between the EI training group and control group, $F(1,132) = .20$, $p = .66$. The influence of EI training on the four subscale EI scores was also examined. There were no significant differences between the training group versus controls, *F's*(1,132) < 1.30, *p's* > .26. See Table 2 for means and standard deviations of the groups. The hypothesis that EI training would increase overall and subscale EI ability scores was not supported.

Effect of EI on Team Functioning

To test the hypothesis that compared to controls, participants who received the EI training would have higher levels of collaboration, an ANCOVA controlling for age was conducted. Those trained in EI did not have significantly higher levels of collaboration than those who did not receive the training, $F(1,132) = .25$, $p = .62$. All subscale group differences were examined and similarly, there were no significant differences, all F's$(1, 131) < 1.31$, p's $> .26$. See Table 2. The hypothesis that EI training would increase collaboration was not supported.

To test the hypothesis that participants receiving the EI training would have higher levels of trust compared to controls, an ANCOVA controlling for age was computed. Those receiving the EI training did not have significantly higher levels of trust than those who did not receive the training, $F(1,131) = .03$, $p = .86$. Ability, benevolence and integrity subscales were examined and there were no significant differences between groups, all F's$(1, 131) < .38$, p's $> .54$. See Table 2. The hypothesis that EI training would increase team trust was not supported.

To test the hypothesis that participants receiving the EI training would have better performance on generative and collaborative team tasks, two ANCOVAs were conducted. For the brick task, those receiving EI training did not have significantly better performance than those who did not receive the training, $F(1,133) = .14$, $p = .71$. The ANCOVA computed for the word completion task included age and task order as covariates. For the word completion task, those receiving EI training had significantly better performance than those who did not receive the training, $F(1,131) = 13.02$, $p < .001$ (see Table 2). The

hypothesis that EI training would increase team performance was partially supported.

Although the majority of the hypotheses were not supported, prior research has suggested that there may still be a relationship between EI and teamwork. To examine this relationship, bivariate correlations were conducted collapsing across the experimental and control conditions. Results showed that overall ability EI, the using emotions subscale, and the managing emotions subscale were all positively correlated with team collaboration and trust, *r's*(133) > .20 *p's* < .05. The perceiving emotions subscale and understanding emotions subscale were positively corelated with team collaboration, *r's*(133) > .25 *p's* < .05, but not trust. Ability EI was not significantly correlated with performance, *r's*(133) < .15 *p's* > .05, except for the managing emotions subscale with the word task performance, $r(133) = .17$ $p < .05$. Collaboration and trust were positively correlated with performance on the word task, *r's*(133) > .18 *p's* < .05. The current study supported prior research while using an ability measure, as opposed to self-report measures as used in past research. Correlations of STEM and non-STEM participants were also examined, however, due to small sample sizes, the results are not discussed at length (see Appendix A).

IV. DISCUSSION

Enhancing emotional competencies may be one route for developing more effective and efficient teams. This study examined whether training such skills through a brief training could improve EI skills, and whether these skills would improve team functioning. Whereas the current study did not find an effect of the EI training on subsequent EI scores, prior research using the MSCEIT has shown that emotional competencies can be trained in adults (Crombie, Lombard, & Noakes, 2011; Reuben, Sapienza, & Zingales, 2009). Although prior research has used ability-based measures to obtain EI scores, there are other differences between the training of the current study and that of prior studies. The EI training used in the present research was of a relatively brief duration (1.5 hours), whereas training implemented in prior research varied from several days to a year (e.g., 10 three-hour sessions across one year). Future research might examine whether there is a targeted amount of training that is needed to influence improvements in emotional competencies. Past research has provided evidence for such an effect. Reuben, Sapienza, and Zingales (2009) found that, in their sample of MBA students, missing EI training sessions was related to a smaller effect of the training. The more sessions missed, the smaller the effect of training, suggesting that the amount of training received indeed plays a role in the effectiveness of the EI training.

In the current study, participants were queried about their thoughts on the training. They indicated that the session was too long, but this included 20 minutes of tasks, an hour of surveys, and the sample was comprised of undergraduates. However, participants did enjoy the highly interactive nature of the training and tasks. Interactive trainings have been shown to be more effective for skill development (Eckerman, Lundeen, Steele, Fercho, Ammerman,

& Anger, 2002; Jezewski, Meeker, Sessanna, & Finnell, 2007; Simmons & Brandon, 2007). The development of future EI trainings should continue the use of interactive training platforms, although the training for the current study may have been too brief to effect EI scores.

Unexpectedly, the training did not influence team collaboration or trust. It could be that the training was too brief to effectively increase EI scores, which then influence team outcomes. Past research has found a relation between EI and teamwork, especially collaboration and trust (e.g., Arfara & Samanta, 2016). However, that past research utilized self-report, and in our view, less accurate measures of EI abilities. In the current study, an examination of bivariate correlations revealed that overall ability EI scores and the using and managing subscale scores were correlated positively with collaboration and trust such that as EI increased, as did collaboration and trust. The perceiving and understanding emotions subscales were not significantly correlated with trust, but they were related to collaboration, as EI scores increased, scores on collaboration increased. This supports prior research finding a positive relation between EI and team functioning (e.g., Arfara & Samanta, 2016). Furthermore, in the current study, collaboration, trust, and the managing emotions subscale scores positively related to the performance on the word task. As scores on collaboration, trust, and managing emotions increased, so did performance on the word task. These findings suggest that although we were not able to improve EI abilities with our training, EI is related to team functioning (collaboration and trust) and team performance. This extends prior literature by showing that the relationship between EI and teamwork remains when using an ability measure of EI. Future research could examine these relationships further by

investigating collaboration and trust as mediating variables in the relation between EI and performance.

There was only one finding for the training of EI abilities, and that was a between-groups difference showing that those receiving training had better team performance on the word task. A significant difference between-groups for EI scores was not found, however, the bivariate correlations revealed that EI scores were correlated with performance. Therefore, it is likely that the component of training that led to better performance was time spent together as a team. When we consider the word task requirements more specifically, that seems to be a plausible explanation for this between groups effect. The word completion task comes from Quadrant II of McGrath's (1984) Circumplex Model of Group Task Types, a taxonomy of tasks requiring particular types of coordination for task completion. Quadrant II involves making decisions or judgements about material with correct answers or consensus answers. It may be that spending time together in training helped participants to arrive at a correct decision on the word task more efficiently as a team. That is, it was not the trained emotional competencies that led to better team performance, but that the team had spent time together and interacted with one another on the EI training, relative to the control group who only interacted by introducing themselves. This time and interaction advantage for the EI training group may have increased collaboration and trust, and ultimately led to better performance on the task that required teams to coordinate to produce a correct answer (i.e., word task). Relative to the word task, the brick task required generative cooperation – coming up with novel ideas and solutions. It requires relatively less collaboration and trust as any team member can generate and contribute any idea without risk.

Although there were some significant findings related to performance, none of the tasks would be considered social problem solving in that there is little to no conflict or negotiation involved. Future research might include tasks that represent each of the four quadrants to allow for a more complete understanding of the relationship between EI and team performance. A second limitation of the current study is that affect was not measured. As taught in the training, emotions can influence how people interact with each other. In future research, affect could be measured to discern its influence on training and other team factors.

In conclusion, the results of the current study do not support the hypotheses, nor some prior literature suggesting that EI can be trained in adults. However, the training used in the present study was relatively brief. In addition, prior research has found a relationship between EI, team collaboration, trust, and performance. Correlations from the current study echo these findings, but the training itself did not affect collaboration or trust. EI training did influence performance, but likely because of the time participants who received training spent together, providing limited insights about the role of EI on team performance. The training appeared to affect tasks that require specific coordination processes among team members (i.e., the word completion task). With the workforce becoming more reliant on teams, particularly in STEM, it is important for researchers to understand how to engender more effective and efficient teams. Despite its limitations, this study found that ability EI is related to team functioning, but training EI skills may require a greater commitment of time from participants.

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Table 1

Bivariate correlations for demographic and scale variables

	M	*(SD)*	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	21.38	(5.44)												
2. Sex			-0.13											
3. Task order			0.00	0.09										
4. Condition			0.05	-0.12	-0.11									
5. Overall EI	95.14	(15.09)	0.20*	0.08	-0.03	-0.03								
6. Perceiving	106.22	(17.09)	0.01	0.10	-0.02	0.03	0.74**							
7. Using	93.17	(14.60)	0.18*	0.08	-0.03	-0.06	0.76**	0.43**						
8. Understanding	91.89	(13.18)	0.19*	-0.01	-0.01	0.05	0.78**	0.43**	0.44**					
9. Managing	93.30	(11.93)	0.24**	0.07	0.03	-0.08	0.81**	0.44**	0.55**	0.56**				
10. TWQ	4.37	(0.42)	0.24**	0.11	-0.01	0.05	0.43**	0.25**	0.35**	0.28**	0.48**			
11. Trust	4.22	(0.55)	0.20*	0.01	-0.08	-0.01	0.27**	0.16	0.20*	0.10	0.37**	0.82**		
12. Brick Task	35.31	(11.67)	-0.07	0.04	0.10	-0.03	0.08	0.11	0.05	-0.02	0.08	0.15	0.13	
13. Word Task	16.89	(6.38)	0.22*	-0.12	0.19*	0.28**	0.15	0.06	0.11	0.14	0.17*	0.24**	0.18*	0.09

Note. $N = 135$ except for TWQ and Trust ($N = 134$). * $p < .05$, ** $p < .01$. Sex was coded as 1 = male and 2 = female. Task order was coded as 1 = word task first, 2 = brick task first. Condition was coded as 0 = control and 1 = experimental.

Table 2

Means (standard deviations) by condition for EI, team collaboration, trust, and performance

	Control		Experimental			
	M	*(SD)*	*M*	*(SD)*	*F*	*p*
Overall EI	95.53	(15.99)	94.70	(14.12)	0.19	0.66
Perceiving	105.75	(17.95)	106.75	(16.16)	0.11	0.74
Using	94.04	(15.01)	92.18	(13.00)	0.72	0.40
Understanding	91.27	(12.55)	92.59	(13.93)	0.23	0.63
Managing	94.23	(12.07)	92.23	(11.77)	1.30	0.26
TWQ	4.35	(0.46)	4.40	(0.38)	0.25	0.62
Communication	4.52	(0.54)	4.57	(0.43)	0.17	0.68
Coordination	4.36	(0.58)	4.34	(0.57)	0.04	0.85
Cohesion	4.23	(0.48)	4.24	(0.41)	0.01	0.93
Support	4.40	(0.57)	4.50	(0.51)	0.79	0.38
Effort	4.41	(0.60)	4.44	(0.50)	0.07	0.79
Balance	4.19	(0.63)	4.33	(0.64)	1.31	0.26
Trust	4.22	(0.56)	4.21	(0.55)	0.03	0.86
Ability	4.45	(0.54)	4.40	(0.50)	0.26	0.61
Benevolence	3.90	(0.78)	3.92	(0.82)	0.00	0.95
Integrity	4.25	(0.59)	4.27	(0.55)	0.02	0.89
Brick Task	35.67	(13.28)	34.90	(9.60)	0.14	0.71
Word Task	15.29	(0.72)	18.67	(0.76)	13.02**	0.00

Note. * $p < .05$, ** $p < .01$.

Appendix A

Table 3

Bivariate correlations of non-STEM participants for demographic and scale variables

	M	*(SD)*	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	21.46	(7.53)												
2. Sex			-0.02											
3. Task order			-0.02	0.12										
4. Condition			0.26	-0.01	-0.18									
5. Overall EI	91.28	(17.55)	0.23	0.01	0.23	0.16								
6. Perceiving	102.35	(19.23)	0.07	0.09	0.07	0.16	0.81**							
7. Using	92.45	(16.90)	0.19	-0.08	0.19	0.09	0.76**	0.48**						
8. Understanding	88.90	(13.56)	0.29	-0.08	0.29	0.12	0.84**	0.54**	0.54**					
9. Managing	90.36	(12.91)	0.27	0.04	0.19	0.11	0.83**	0.55**	0.53**	0.67**				
10. TWQ	4.33	(0.42)	0.24	0.07	-0.20	0.28	0.46**	0.36*	0.26	0.27	0.62**			
11. Trust	4.20	(0.57)	0.23	0.00	-0.24	0.24	0.23	0.26	0.08	-0.03	0.44**	0.83**		
12. Brick Task	35.89	(15.24)	-0.14	-0.7	0.11	0.02	0.08	0.26	-0.04	-0.06	0.09	0.26	0.26	
13. Word Task	16.70	(7.30)	0.11	-0.20	0.08	0.32	0.25	0.15	0.28	0.16	0.23	0.22	0.22	0.30

Note. $N = 37$ * $p < .05$, ** $p < .01$. Sex was coded as 1 = male and 2 = female. Task order was coded as 1 = word task first, 2 = brick task first. Condition was coded as 0 = control and 1 = experimental.

Table 4

Bivariate correlations of STEM participants for demographics and scale variables

	M	*(SD)*	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	21.35	(4.44)												
2. Sex			-0.21*											
3. Task order			1.34	0.08										
4. Condition			-0.07	-0.16	-0.08									
5. Overall EI	96.60	(13.88)	0.19	0.11	0.05	-0.14								
6. Perceiving	107.68	(16.07)	-0.03	0.12	0.05	-0.05	0.69**							
7. Using	93.44	(13.72)	0.17	0.14	0.01	-0.14	0.76**	0.40**						
8. Understanding	93.01	(13.72)	0.13	0.02	0.05	0.00	0.75**	0.36**	0.39**					
9. Managing	94.41	(11.41)	0.29**	0.09	0.06	-0.19	0.80**	0.36**	0.57**	0.50**				
10. TWQ	4.39	(0.42)	0.23**	0.12	0.07	-0.04	0.41**	0.20	0.39**	0.27**	0.43**			
11. Trust	4.23	(0.55)	0.19	0.01	-0.02	-0.11	0.29**	0.12	0.25*	0.15	0.33**	0.81**		
12. Brick Task	35.09	(10.09)	0.00	0.09	0.10	-0.06	0.08	0.02	0.11	0.01	0.09	0.16	0.05	
13. Word Task	16.96	(6.04)	0.31**	-0.08	0.25*	0.26*	0.10	0.01	0.02	0.14	0.14	0.21*	0.16	0.07

Note. $N = 98$ except for TWQ and Trust ($N = 97$). * $p < .05$, ** $p < .01$. Sex was coded as 1 = male and 2 = female. Task order was coded as 1 = word task first, 2 = brick task first. Condition was coded as 0 = control and 1 = experimental.